

of such a formula. Whoever will have a formula, whoever says "I absolutely want a formula, I wish to be perfectly at one with myself, I must have a coherent conception of the universe," must either admit *generatio æquivoca* or creation; there is no other alternative. If we want to be outspoken we may indeed own that naturalists may have a slight predilection for *generatio æquivoca*. It would be very beautiful if it could be proved.

But we must admit that it is not yet proved. Proofs are still wanting. If any kind of proof were to be successfully given we would acquiesce. But even then it would have to be determined first, to what extent we could admit *generatio æquivoca*. We should quietly have to continue our investigations, because nobody will think that spontaneous generation is valid for the totality of organic beings. Possibly it would only apply to a single series of beings. But I believe we have time to wait for the proof. Whoever remembers in what a regrettable manner, quite recently, all attempts to find a certain basis for *generatio æquivoca* in the lowest forms of the transition from the inorganic to the organic world, have failed, should consider it doubly dangerous to demand that this ill-reputed doctrine should be adopted as a basis for all human conceptions of life. I may, doubtless, suppose that the story of the *Bathybius* has become known to nearly all educated persons. With this *Bathybius* the hope has again vanished that *generatio æquivoca* can be proved.

I think, therefore, that with regard to this first point, the point of the connection between the organic and the inorganic, we must simply own that in reality we know nothing about it. We may not set down our supposition as a certainty, our problem as a dogma; that cannot be permitted. Just as in the progress of the doctrines of evolution it has been far more certain, more fertile, and more in accordance with the progress of accredited natural science, to analyse the original single doctrine part by part, we shall also have first to keep apart the organic and inorganic things in the old well-known analysing way, and not to throw them together prematurely.

Nothing, gentlemen, has been more dangerous to natural science, nothing has done more harm to its progress and to its position in the opinion of nations than premature syntheses. While laying stress upon this, I would point out specially how our Father Oken was damaged in the opinion not only of his contemporaries, but also in that of the following generation, because he was one of those who admitted syntheses into their conceptions to a far greater extent than a stricter method would have allowed. Do not let us lose the example of the natural philosophers; do not let us forget that every time that a doctrine which has assumed the air of a certain, well-founded, and reliable one, of one which claims general validity, turns out to be faulty in its outlines, or is found to be an arbitrary and despotic one in essential and great points, then a great number of men lose their faith in science entirely. Then the reproaches begin—"You are not sure even yourselves; your doctrine, which is called truth to-day, is a falsehood to-morrow; how can you demand that your doctrine shall become the object of instruction and of the general consciousness?" From such experiences I take the warning that if we wish to continue to claim the attention of all we must resist the temptation of pushing our suppositions, our merely theoretical and speculative structures into prominence to such a degree that from them we would construct the conception of the whole remaining universe.

(To be continued.)

THE METEOR

A METEOR of unusual brilliancy was seen on the evening of Friday, the 23rd inst., from various parts of the kingdom. Mr. F. A. Buxton writing to us from Hertford states that he saw it two miles north of that town at 8.26 P.M. He says:—"I was attracted by its glare notwithstanding the moonlight, and saw it moving vertically downwards. I could not accurately observe its path, but it passed, nearly or exactly, over a small star, just visible in the moonlight, which I think is π Herculis, and disappeared suddenly before it reached the horizon, in about N.P.D. 60 and R.A. 16°40'. By comparing notes with another observer (half a mile north of Hertford) it appears to have been visible much nearer the zenith than I had seen it; probably I saw the last 15° of its path. From the apparent slowness of its motion and complete absence of sound I gather that it was far off. My guess at the moment was fifty miles. In consequence of its brightness its apparent diameter was probably illusory. It attained two *maxima* of splendour, one about over the star

named, the other at its disappearance. Scarcely any 'trail' was left; what there was almost immediately vanished."

Mr. T. Mellard Reade writes that he saw it from Blundell-sands, Liverpool, at 8.20 P.M. Looking up he saw a splendid broad streak of blue light terminating in a ball of red fire rushing across the sky in a north-westerly direction. The first flash seemed directly overhead; if so, Mr. Reade states, the meteor must have travelled through at least 45°. Shortly afterwards the moon being intensely bright and a shower coming on from the west, across the sea a most splendid "moon" rainbow made its appearance, finishing as a perfect arch of vivid colours with a second and a perfect bow above it.

Mr. W. B. Ferguson writes from Edinburgh that while walking down Princes Street about 8.25 P.M. he saw a most brilliant meteor which appeared to fall almost vertically and burst with great brilliance apparently just behind the castle. Its direction from where he observed it was 10° west of south.

Mr. C. H. Dance, writing from Manor House, Ardwick, Manchester, gives the time as 8h. 25m. P.M. Greenwich mean time. The meteor, he states, appeared to come from the constellation Cassiopeia, and after travelling in a direction a little to the west of north, finally burst behind a cloud about thirty degrees above the horizon. The apparent size of the meteor was considerably greater than that of Mars during the late opposition, and the light which it emitted was intensely bright and of a bluish-green colour, leaving a decidedly red impression on the retina. The period of visibility would be about five seconds, and the sparks in the train were also visible for some seconds.

Mr. Plant, the Curator of the Salford Museum, observed the meteor at the same time, visible to the north of Manchester.

Dr. S. Drew, of Sheffield, saw it at about 8.30 P.M. He gives the apparent diameter as two minutes; path, from the square of Pegasus to near Altair; motion, slow; shape, at first globular, afterwards elongated, with tail. It then appeared to break up. Colour, at first blue-green, afterwards ruddy; light, brilliant. He heard no sound accompanying the meteor, and from the absence of sound and slow apparent motion, he infers the real distance and size of the bolide to have been great. Dr. Drew was, at the time of observation, a little to the west of the town of Rotherham.

Several correspondents write to the *Times* describing what they saw of this remarkable meteor, for it is evidently the same body which has been seen by the various observers. The Liverpool correspondent of the *Times* saw it about 8.30. "A large ball of fire shot from the sky, exploding and throwing off innumerable variegated sparks as it descended in a northerly direction. The track of sparks gave the meteor the appearance of a brilliant comet with a long tail. Some spectators state that they heard the hissing noise made in its course, and others allege that it descended into the water near the bar of the Mersey with a great noise, sending up a column of steam and spray."

Mr. Donald Mackay saw it from Victoria Street, London, shortly before 8.30 P.M. "It travelled with great rapidity for about 20° from the zenith to the horizon, bursting in a white ball as large as twelve of the planet Mars in one, lighting up all the houses surrounding Victoria Street, the point of observation, and leaving a large tail behind of the shape of a spear-head, with all the colours of the rainbow in it."

The Rev. J. Hoskyns-Abrahall writes from Combe Vicarage, near Woodstock, that about 8.20 the northern sky was suddenly lighted up with a glow that outshone that spread over the south-eastern sky by a moon nearly full. "Looking northwards I saw a globular meteor of a pale orange colour descending perpendicularly. Its apparent size was scarcely less than that of the moon. Just above the slope on which I was, and seemingly not half a mile off, it burst into huge fragments, which flared forth with a fierce, lightning-like, reddish glare, and scattered sparks of surpassing splendour."

Mr. D. Aldred writes from Milford, Derby, to the same effect. He saw the meteor about six miles north of Derby, about 8.25. "It was almost due north, and travelling from the zenith to the horizon, the point of dispersion being about 45° above the north point of the horizon. In shape it was conical, the greatest breadth about one and a half times the diameter of the moon. It left a trail of considerable length, and the colours detached were of most remarkable brilliancy."

"R. M. C." writes from Cathedine, Brecknockshire, giving the report of two reliable witnesses who were walking in an easterly direction at 8.25 P.M. Looking back, the moon being at the time obscured by a cloud, they saw a ball of the most intense white light, "about the size of a cannon-ball," travers-

ing a space between two clouds, leaving behind it a fiery track of red.

A Worcester correspondent gives the time as 8.20. He describes the colour as brilliant blue and orange, and behind was a streaming trail of brilliant sparks, which remained visible for a few seconds after the brighter light had disappeared.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—At a Congregation on November 22, the University seal was ordered to be affixed to a letter of thanks to his Grace the Chancellor of the University for his munificent gift of a complete apparatus of scientific instruments for the Cavendish Laboratory.

A meeting of the members of the University to consider the propriety of securing a personal memorial of Dr. Darwin, was held on Monday in the combination room of Christ's College, the Rev. Dr. Cartmell, Master of the College, presiding. It was proposed by Prof. Humphry and seconded by Prof. Fawcett, "That it is desirable that the University should possess a personal memorial of Mr. Charles Darwin, LL.D." Proposed by Prof. Newton and seconded by Mr. Piele, of Christ's, "That the members of the University now present form themselves into a committee, with power to add to their number, for the purpose of collecting subscriptions from members of the University to carry out the foregoing resolution." Proposed by Prof. Liveing, seconded by Mr. J. W. Clark, "That Mr. A. G. Dew-Smith, of Trinity College, be treasurer and secretary to the committee, and be authorised to receive subscriptions." It was understood that the memorial should assume the form of a portrait, and about 75% was subscribed in the room.

EDINBURGH.—The subscriptions to the Edinburgh University Extension Fund now amount to 82,000*l.*, and Government has now promised to add 80,000*l.* to the amount on condition that 25,000*l.* is raised by public subscription, of which the sum of 10,000*l.* must be subscribed by December 31st next. The University Professors at Edinburgh have already contributed among themselves 5,360*l.* towards the additional 25,000*l.* required.

ST. ANDREWS.—Lord Selborne has been elected Lord Rector of this University. The students had much difficulty in getting any eminent man to allow himself to be nominated, and it was only on the day previous to the election that it was resolved to pit Lord Selborne against the Right Hon. Gathorne Hardy.

Prof. Alleyne Nicholson has been appointed Swiney Lecturer on Geology by the Trustees of the British Museum.

LEIPZIG.—Prof. Leuckhart, the newly-elected Rector of the University, was installed into the duties of the office on October 31, and delivered on the occasion an able address "On the Development of Zoology up to the Present Time, and its Importance." The students already number nearly 3,200, an attendance, as usual, far above that of any other German university.

AMSTERDAM.—The new University of Amsterdam has lately made a most flattering offer to Prof. Gegenbaur, of Heidelberg, which has, however, been declined.

BERGEN.—It is intended to establish a new university in the Norwegian town of Bergen. Eighty thousand crowns have already been subscribed towards this object.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, November 8.—Lord Rayleigh, F.R.S., president, in the chair.—The following were elected to form the Council during the session:—President: Lord Rayleigh, F.R.S. Vice-Presidents: Prof. J. Clerk Maxwell, F.R.S., Mr. C. W. Merrifield, F.R.S., Prof. H. J. S. Smith, F.R.S. Treasurer, Mr. S. Roberts. Hon. Secretaries: Messrs. M. Jenkins and R. Tucker. Other members, Prof. Cayley, F.R.S., Mr. T. Cotterill, Mr. J. W. L. Glaisher, F.R.S., Mr. H. Hart, Dr. Henrici, F.R.S., Dr. Hirst, F.R.S., Mr. Kempe, Dr. Spottiswoode, F.R.S., Mr. J. J. Walker.—Prof. Cayley made two communications, on the function $\phi(x) = \frac{ax+b}{cx+d}$ (a singularly neat expression was got for $\phi^n(x)$, the late Mr.

Babbage had considered the matter in 1813), and on the theta functions.—Mr. Tucker read a portion of a paper by Mr. Hugh MacColl (communicated by Prof. Crofton, F.R.S.) entitled the calculus of equivalent statements. A short account of this analytical method has been given in the July and November numbers (1877) of the *Educational Times*, under the name of Symbolical Language. The chief use at present made of it is to determine the new limits of integration when we change the order of integration or the variables in a multiple integral, and also to determine the limits of integration in questions relating to probability. This object, the writer asserts, it will accomplish with perfect certainty, and by a process almost as simple and mechanical as the ordinary operations of elementary algebra.—The president read a paper on progressive waves. It has often been remarked that when a group of waves advance into still water the velocity of the group is less than that of the individual waves of which it is composed; the waves appear to advance through the group, dying away as they approach its anterior limit. This phenomenon seems to have been first explained by Prof. Stokes, who regarded the group as formed by the superposition of two infinite trains of waves of equal amplitudes and of nearly equal wave-lengths advancing in the same direction. The writer's attention was called to the subject about two years since by Mr. Froude, and the same explanation then occurred to him independently. In his work on "The Theory of Sound" (§ 191), he has considered the question more generally. In a paper read at the Plymouth meeting of the British Association (afterwards printed in *NATURE*), Prof. Osborne Reynolds gave a dynamical explanation of the fact that a group of deep-water waves advances with only half the rapidity of the individual waves. Another phenomenon (also mentioned to the author by Mr. Froude) was also discussed as admitting of a similar explanation to that given in the present paper. A steam launch moving quickly through the water is accompanied by a peculiar system of diverging waves, of which the most striking feature is the obliquity of the line containing the greatest elevation of successive waves to the wave-fronts. This wave-pattern may be explained by the superposition of two (or more) infinite trains of waves, of slightly differing wave-lengths, whose direction and velocity of propagation are so related in each case that there is no change of position relatively to the boat. The mode of composition will be best understood by drawing on paper two sets of parallel and equidistant lines, subject to the above conditions, to represent the crests of the component trains. In the case of two trains of slightly different wave-lengths, it may be proved that the tangent of the angle between the line of maxima and the wave-fronts is half the tangent of the angle between the wave-fronts and the boat's course.—Prof. Clifford, F.R.S., communicated three notes. (1) On the triple generation of three-bar curves. *If one of the three-bar systems is a crossed rhomboid, the other two are kites.* This follows from the known fact that the path of the moving point in both these cases is the inverse of a conic. But it is also intuitively obvious as soon as the figure is drawn, and thus supplies an elementary proof that the path is the inverse of a conic in the case of a kite, which is not otherwise easy to get. (2) On the mass-centre of an octahedron. The construction was suggested by Dr. Sylvester's construction for the mass centre of a tetrahedral frustum. (3) On vortex-motion. The problem solved by Stokes as a general question of analysis, and subsequently by Helmholtz for the special case of fluid motion may be stated as follows: given the expansion and the rotation at every point of a moving substance, it is required to find the velocity at every point. The solution was exhibited in a very simple form.

Zoological Society, November 6.—Mr. A. Grote, vice-president, in the chair.—A letter was read from Mr. R. Trimmen, containing remarks on the African species of *Sarcidiornis*.—A letter was read from Mr. A. O. Hume, containing some remarks on Mr. Howard Saunders' recent paper on the Sterninae.—The secretary exhibited, on the part of Mr. Geo. Dawson Rowley, an egg of *Pauxis galeata*, laid by a black female.—Prof. W. H. Flower, F.R.S., read a paper entitled "A Further Contribution to the Knowledge of the existing Ziphioid Whales of the Genus *Mesoplodon*, containing a Description of a Skeleton and several Skulls of Cetaceans of that Genus from the Seas of New Zealand."—A communication was read from Lieut.-Col. R. H. Beddome, containing the descriptions of three new species of reptiles from the Madras Presidency. These were proposed to be called *Oligodon travancoricum*, *Gymnodactylus jeyporensis*, and *Bufo travancoricus*.—A communication was read from the Marquis of Tweeddale, F.R.S., containing an account of a collection of